WHAT IS CLAIMED IS:

SUB A1

1. A method of forming a nitride-based semiconductor layer, comprising the steps of:

growing a buffer layer of $Al_xGa_{1-x}N$ ($0 \leqq X \leqq 1$) on a substrate at a growth rate of at least 7 Å/sec; and

growing a nitride-based semiconductor layer of $Al_aB_bIn_cTl_dGa_{1-a-b-c-d}N$ ($0 \leqq a < 1$, $0 \leqq b < 1$, $0 \leqq c < 1$, $0 \leqq d < 1$, $a+b+c+d < 1$) on said buffer layer.

2. The method of forming a nitride-based semiconductor layer according to claim 1, wherein

said step of growing the buffer layer comprises growing said buffer layer at a growth rate of at most 51 Å/sec.

3. The method of forming a nitride-based semiconductor layer according to claim 1, wherein

B1

said step of growing the buffer layer comprises growing said buffer layer at a growth rate in the range from 16 Å/sec to 42 Å/sec.

4. The method of forming a nitride-based semiconductor layer according to claim 1, wherein

said step of growing the buffer layer comprises growing said buffer layer at a growth rate in the range from 25 Å/sec

to 29 Å/sec.

5. The method of forming a nitride-based semiconductor layer according to claim 1, wherein

said step of growing the buffer layer comprises adjusting the growth rate of said buffer layer by the supply amount of a group III element supplied at the time of growing said buffer layer.

6. The method of forming a nitride-based semiconductor layer according to claim 1, wherein

said step of growing the buffer layer comprises growing said buffer layer to have a film thickness in the range from 50 Å to 300 Å.

7. The method of forming a nitride-based semiconductor layer according to claim 1, wherein

said step of growing the buffer layer comprises growing said buffer layer to have a film thickness in the range from 100 Å to 200 Å.

8. The method of forming a nitride-based semiconductor layer according to claim 1, wherein

said step of growing the buffer layer comprises growing said buffer layer at a substrate temperature in the range from

500°C to 700°C.

9. The method of forming a nitride-based semiconductor layer according to claim 1, wherein

said step of growing the buffer layer comprises growing said buffer layer at a substrate temperature in the range from 550°C to 650°C.

SUB A2

10. A method of manufacturing a nitride-based semiconductor device, comprising the steps of:

growing a buffer layer of $Al_xGa_{1-x}N$ ($0 \leqq X \leqq 1$) on a substrate at a growth rate of at least 7 Å/sec; and

growing a nitride-based semiconductor layer including an active device region on said buffer layer and made of $Al_aB_bIn_cTl_dGa_{1-a-b-c-d}N$ ($0 \leqq a < 1$, $0 \leqq b < 1$, $0 \leqq c < 1$, $0 \leqq d < 1$, $a+b+c+d < 1$) on said buffer layer.

11. The method of manufacturing a nitride-based semiconductor device according to claim 10, wherein

said step of growing the buffer layer comprises growing said buffer layer at a growth rate of at most 51 Å/sec.

12. The method of manufacturing a nitride-based semiconductor device according to claim 10, wherein

said step of growing the buffer layer comprises growing

said buffer layer at a growth rate in the range from 16 Å/sec to 42Å/sec.

13. The method of manufacturing a nitride-based semiconductor device according to claim 10, wherein

said step of growing the buffer layer comprises growing said buffer layer at a growth rate in the range from 25 Å/sec to 29 Å/sec.

14. The method of manufacturing a nitride-based semiconductor device according to claim 10, wherein

said step of growing the buffer layer comprises adjusting the growth rate of said buffer layer by adjusting the supply amount of a group III element supplied at the time of growing said buffer layer.

15. The method of manufacturing a nitride-based semiconductor device according to claim 10, wherein

said step of growing the buffer layer comprises growing said buffer layer to have a film thickness in the range from 50 Å to 300 Å.

16. The method of manufacturing a nitride-based semiconductor device according to claim 10, wherein

said step of growing the buffer layer comprises growing

said buffer layer at a substrate temperature in the range from 500°C to 700°C.

17. The method of manufacturing a nitride-based semiconductor device according to claim 10, wherein

said step of growing the nitride-based semiconductor layer comprises forming as said active device region a light emitting layer or an active layer in a semiconductor light emitting device, a core layer in a waveguide device, an I layer in a PIN photodiode, a pn junction portion in a photodiode or a hetero-junction bipolar transistor or a channel portion in a field effect transistor.

18. The method of manufacturing a nitride-based semiconductor device according to claim 10, wherein

said step of growing the nitride-based semiconductor layer comprises forming a cladding layer of a first conductivity type, an active layer and a cladding layer of a second conductivity type in this order.